stay will be made for a few days, when the edge of the ice in the west will be made for, which will be followed southwards, but no attempt should then be made to penetrate the pack. Only in case there should be found an open lead, which is not expected, this will be entered. The probability of this is, however, very small. After having passed Cape Farewell, the vessel will call at Ivigtuk, where again it will be coaled from the depots which have been laid up here for the use of the steamer. The course will then be shaped for the west coast of Greenland, probably calling at Egedesminde, to the Auleitsivik Fjord, from the bottom of which the ice-journey will be commenced.

This latter will occupy, it is estimated, thirty to forty days, and should be finished thus by the middle of August next. During this time the vessel will steam through the Waigatt to Omenak, where the many deposits of fossil plants will be visited. If the ice and coals should permit, the vessel will steam northwards, if possible as far as Cape York, whereby an excellent opportunity will be offered for geological, mineralogical, botanical, and zoological studies. In the middle of August the vessel will again be due in the Auleitsivik Fjord, and taking the members of the ice-expedition on board, will steam south to Ivigtuk, where a few days' stay will be made for coaling, etc. From here the vessel will steam round Cape Farewell, along the east coast in the open channel, which I expect to find there at that season; and my intention is then, with due reference to the old geographical descriptions of the Icelandic Sagas, carefully to search the fjords which may be accessible.

At the end of September the return journey will be commenced outside the belt of pack-ice to Reikiavik and home.

The distances the vessel will cover are, in round figures, these:—

			Nautical Miles
GOTHENBURG ...	to	THURSO	500
THURSO	„	REIKIAVIK	700
REIKIAVIK	„	IVIGTUK	870
IVIGTUK	„	AULEITSIVIK FJORD	540
AULEITSIVIK FJORD	„	OMENAK	330
OMENAK	„	CAPE YORK	400

A. E. NORDENSKIÖLD

NOTES

THE Fifty-third Annual Meeting of the British Association will commence on Wednesday, September 19, 1883, at Southport. The President Elect is Arthur Cayley, LL.D., F.R.S., Sadlerian Professor of Mathematics in the University of Cambridge. The Vice-Presidents Elect are the Right Hon. the Earl of Derby, the Right Hon. the Earl of Crawford and Balcarres, the Right Hon. the Earl of Lathom, Prof. J. G. Greenwood, LL.D., Prof. H. E. Roscoe, LL.D., F.R.S. The General Treasurer is Prof. A. W. Williamson, Ph.D., F.R.S., University College, London. The General Secretaries are Capt. Douglas Galton, C.B., F.R.S., and A. G. Vernon Harcourt, F.R.S. The Secretary is Prof. T. G. Bonney, F.R.S. The Local Secretaries are J. H. Ellis, Dr. Vernon, T. W. Willis; and the Local Treasurer the Mayor of Southport. The Sections are the following:—A.—Mathematical and Physical Science.—President: Prof. Henrici, F.R.S. Vice-Presidents: Prof. Balfour Stewart, M.A., LL.D., F.R.S., F.R.A.S.; Prof. Stokes, M.A., D.C.L., LL.D., Sec.R.S. Secretaries: W. M. Hicks, M.A.; Prof. O. J. Lodge, D.Sc.; D. McAlister, M.A., M.B., D.Sc. (Recorder); Prof. Rowe, M.A., B.Sc. B.—Chemical Science.—President: J. H. Gladstone, Ph.D., F.R.S. Vice-Presidents: Hugo Müller, Ph.D., F.R.S., For. Sec. C.S.; Prof. T. E. Thorpe, Ph.D., F.R.S., F.C.S. Secretaries: Prof. P. Phillips Bedson, D.Sc., F.C.S. (Recorder); H. B. Dixon, M.A., F.C.S.; H. Foster Morley, M.A., B.Sc., F.C.S. C.—Geology.—President: Prof. W. C. Williamson, F.R.S. Vice-Presidents: Prof. W. Boyd Dawkins, M.A., F.R.S., F.S.A., F.G.S.; J. W. Hulke, F.R.S., Pres.G.S. Secretaries: R. Betley, F.G.S.; C. E. de Rance, F.G.S.; W. Topley, F.G.S. (Recorder); W. Whitaker, B.A., F.G.S. D.—Biology.—President: Prof. E. Ray Lankester, F.R.S. Vice-Presidents: Prof. Gamgee, M.D., F.R.S.; W. Pengelly, F.R.S., F.G.S.; Prof. Schäfer, F.R.S.; W. T. Thiselton Dyer, M.A., B.Sc., F.R.S., F.L.S. Secretaries: G. J. Haslam, M.D.; W. Heape; Prof. A. M. Marshall, M.A., M.D., D.Sc.; Howard Saunders, F.L.S., F.Z.S. (Recorder); G. A. Woods. Department of Anthropology: W. Pengelly, F.R.S., F.G.S. (Vice-President), will preside. Secretaries: G. W. Bloxam, M.A., F.L.S. (Recorder); Walter Hurst. E.—Geography.—President: Lieut.-Col. H. H. Godwin-Austen, F.R.S., F.G.S., F.R.G.S. Vice-Presidents: Sir Rawson W. Rawson, K.C.M.G., C.B., F.R.G.S.; The Rev. Canon Tristram, M.A., LL.D., F.R.S., F.L.S. Secretaries: John Coles, F.R.A.S., F.R.G.S.; E. G. Ravenstein, F.R.G.S.; E. C. Rye, F.Z.S. (Recorder). F.—Economic Science and Statistics.—President: R. H. Inglis Palgrave, F.R.S., F.S.S. Vice-Presidents: Prof. R. Adamson, M.A., LL.D.,; J. Heywood, F.R.S., F.G.S., F.S.A., F.S.S. Secretaries: Prof. H. S. Foxwell, M.A., F.S.S.; J. N. Keynes, M.A., B.Sc.; Constantine Molloy (Recorder). G.—Mechanical Science.—President: James Brunlees, F.R.S.E., F.G.S., Pres. I.C.E. Vice-Presidents: W. H. Barlow, F.R.S., M.I.C.E.; Prof. Osborne Reynolds, M.A., F.R.S. Secretaries: A. T. Atchison, M.A., C.E.; Edward Rigg, M.A.; H. T. Wood, B.A. (Recorder). The first general meeting will be held on Wednesday, September 19, at 8 p.m., when Sir C. W. Siemens, D.C.L., LL.D., F.R.S., F.C.S., M.I.C.E., will resign the Chair, and Prof. Cayley, M.A., LL.D., F.R.S., V.P.R.A.S., President Elect, will assume the Presidency, and deliver an address. On Thursday evening, September 20, at 8 p.m., there will be a soirée; on Friday evening, September 21, at 8.30 p.m., a Discourse on Recent Researches on the Distance of the Sun, by Prof. R. S. Ball, LL.D., F.R.S., Astronomer Royal for Ireland; on Monday evening, September 24, at 8.30 p.m., a Discourse on Galvani and Animal Electricity, by Prof. J. G. McKendrick, M.D., LL.D., F.R.S.E., Professor of Physiology in the University of Glasgow, and in the Royal Institution of Great Britain; on Tuesday evening, September 25, at 8 p.m., a soirée; on Wednesday, September 26, the concluding general meeting will be held at 2.30 p.m.

THE number of members of the British Association who have announced their intention of being present at the proposed meeting at Montreal in 1884, continues to increase, and now exceeds 410. It is stated that Lord Rayleigh has accepted the presidency for the Canadian meeting.

PROF. HUXLEY has been elected a Foreign Member of the U.S. National Academy.

FROM a list of seven names proposed by the Incorporated Societies throughout the colony, the following gentlemen have been elected honorary members of the New Zealand Institute:—Sir William Thomson, F.R.S., Professor of Natural Philosophy, University of Glasgow; Dr. W. B. Carpenter, F.R.S., C.B., of London; and Mr. R. L. J. Ellery, F.R.S., Government Astronomer at Melbourne.

PROF. TYNDALL has resigned his position as Scientific Adviser to the Board of Trade and the Lighthouse Boards.

WE are glad to see the ample recognition of music during the present week by the conferring of knighthood on Messrs. Sullivan, Grove, and Macfarren in connection with the New College of Music. Let us hope that the science of music as well as the art will receive due cultivation in the new institution; with Sir George Grove's well-known wide sympathies, however, this may be taken for granted.

The first eclipse news comes from Lima, under date May 7; the sky was overcast on the 6th, preventing any observation of the eclipse. It is to be hoped the conditions were more favourable on the other side of the Pacific.

The proposal to open museums and galleries on Sundays was, we regret to say, lost in favour of Lord Shaftesbury's compromise to keep them open in the evenings on two or three nights a week, which does not in the least meet the case of the working classes.

M. Richi, Professor in the Paris School of Medicine, was nominated Member of the Academy of Sciences on Monday, to fill the place vacated by the death of M. Sedillot. Another election will soon take place in the same section of medicine and surgery.

Mr. A. H. Keane proposes, as soon as he obtains a sufficient number of subscribers, to begin the publication of "A Classification of the Races of Mankind," copious materials for which have now been collected. It will form two large octavo volumes of about six hundred pages each. The publication will probably extend over two years, and at least five hundred names will be required to justify the undertaking, although subscribers to the first need not be committed to purchase the second part also. Subscriptions will be received by Mr. Edward Stanford, 55, Charing Cross, or by Mr. Keane, at University College, London. With regard to the scope and contents of the work, it may be briefly stated that its aim will be to place in the hands of the ethnological student a comprehensive treatise on the races of mankind harmonising with the present state of anthropological inquiry. In the general introduction such broad questions will be dealt with as the evolution of man, the antiquity and specific unity of the species, the present varieties of mankind, the physical and moral criteria of race, the fundamental human types, their evolution and dispersion, the peopling of the continents, the origin of articulate speech, the morphological orders and families of speech, the problem of specific linguistic diversity within the same ethnical group. The great physical divisions of the human family will then be dealt with *seriatim*, and here the same arrangement will be adhered to as that observed in Mr. Keane's ethnological appendices to the Stanford Geographical Series. Each of the main sections of mankind will thus be treated in three separate parts. In the first the salient physical and moral characteristics of the type will be discussed. The second will be occupied with the several main branches of each, and here the proper work of classification will be carried out in detail. Lastly, the third part will consist of an alphabetical index, comprising, as far as Mr. Keane has been able to collect them, all the known races, tribes, and languages of each main division, briefly described, and with copious references to authorities. The price of the work will be 16*s*. per volume to subscribers.

The Dutch Polar ship *Willem Barents* started again on Saturday from Amsterdam, under the command of Capt. Dalen, for the Arctic regions, to try to discover the Dutch expedition in the *Varna*. Mr. Leigh Smith was present, as well as Mr. Clements Markham, to wish the *Willem Barents* "God speed." Sir Allen Young went over to express his best wishes to the crew of the Dutch ship. Mr. Leigh Smith presented to Capt. Dalen two magnificent silver cups, bearing as an inscription the following words, taken from his journal: "August 3d, 1882; Matotchkin Skarr, Nova Zembla, 10.0 a.m. A sail! A sail! The *Willem Barents*."

The Danish expedition to Greenland left Copenhagen on Wednesday last week. Its purpose is to explore the east coast of Greenland; and it will probably be away for two years.

The Sanitary Institute of Great Britain held its annual meeting at 9, Conduit Street, on Monday, Prof. de Chaumont, M.D., F.R.S., in the chair. A report was presented by the Council on the progress of the Institute and on the work at the Congress and Exhibition held by the Institute at Newcastle last autumn. The Chairman gave an address, and the officers for the ensuing year were elected, the President being the Duke of Northumberland, and the trustees Sir John Lubbock, Bart., Mr. Thomas Salt, M.P., and Dr. B. W. Richardson.

The Prince of Wales opened the Indian Institute at Oxford last week.

Two divisions of the pupils of Sainte Barbe left Paris on May 4, one for London, and the other for Germany, where they are to stay for three months under the care of their professors, for the purpose of obtaining practical knowledge of the English and German languages.

Rear-Admiral Mouchez is leaving Paris within a few days. for Algiers, where he will establish an observatory at Coubar. This site is deemed excellent for observations.

We have received the announcement of an aëronautical exhibition, to be held from June 5 to 15 at the Trocadéro, Paris.

The Whit Monday excursion of the Geologists' Association will be to Hunstanton; and on May 26 to Ealing and Perivale.

The well-known explorer of the fauna and depths of Lake Baikal, Dr. Godlevsky, who is now in Kamchatka, writes to the East Siberian Geographical Society, from Petropavlovsk, that last summer he transported on board of a steamer of the company Hutchinson, Kool, and Co., fifteen reindeer, of which eleven were males and four females, to Behring's Island. The reindeer were brought to Petropavlovsk from the west coast of Kamchatka in a flock of 150, and the journey took no less than two and a half months, as it was made across the mountains in order to avoid the mosquitos of the valleys. On board the steamer the reindeer were fed with stems and leaves of birch, as also with fresh grass kept in casks with water. Afterwards they also ate hay, and even bread, contrary to the affirmations of the Lamuts, who said that reindeer never eat grass that has been gathered by man. The steamer-journey was made in two days, and the reindeer arrived in good health.

When leaving Yakutsk for the mouth of the Lena, M. Yurgens distributed a number of thermometers to different persons. The *Izvestia* of the East Siberian branch of the Russian Geographical Society now publish the meteorological observations made at Markha, in the province of Yakutsk, district of Viluisk, during the four months of August to November last, by an exile, M. Pavloff. The rapidity with which the cold weather sets in in those latitudes is very interesting. In August the thermometer rose at 1 p.m. as high as 31° Cels. (on August 1), and reached 14° to 20° during the second half of the month. The first frosts were experienced (at 7 a.m.) in September, and already in the first days of October the thermometer sunk (at 7 a.m.) as low as -11^{c} to $-20°$; and as low as $-30°$ to $-35°$, and even $-39°$, during the second half of October. In November it never rose above $-32°$, and usually stood at seven o'clock in the morning between $-39°$ to $-50°$; even at 1 p.m. it did not rise, during the whole of the month, above $-31°$, and usually stood between $-33°$ to $-42°$, occasionally sinking to $-48°$ and $-50°$ Cels. The underground thermometer, placed at 1·5 feet below the surface, decreased with a remarkable regularity, from 6°·8, on August 1, to 0° on September 12 to 17, to $-2°$ on October 17, to $-6°$ on November 1, and to $-17°$ on November 30.

A correspondent points out that at the conclusion of the address by Prof. Du Bois Reymond on "Darwin and Copernicus"

(NATURE, vol. xxvii. p. 558), it is stated that "Charles Darwin lies buried in Westminster Abbey among his peers, Newton and Faraday," whereas Faraday lies buried in the unconsecrated ground at Highgate, and not in Westminster Abbey.

ACCORDING to information received from the United States, some wonderful telephonic feats are being performed by the new Hopkins arrangement. It seems that two operators—one at New York and the other at Chicago, 1100 miles apart—had no difficulty, not only in talking to each other, but in listening to music, and fulfilling other tests. Even the noise produced by changing the diaphragm at New York was distinctly heard at Chicago.

THE Institute of Agriculture at South Kensington completed the work of its first session on Monday, the 7th inst. The Earl of Aberdeen, Chairman of the Council, presided, and distributed Certificates of Merit to 103 students. Notice was given of largely increased opportunities for study during the next session, which commences on October 1.

THE National Eisteddfod of Wales is not without an appreciation for science; in its list of prizes three are offered in natural history, one of 10*l*. 10*s*., open to all comers, being for the best model of a skeleton of Plesiosaurus. Length of model not to be less than 4 feet, each bone to be separately modelled and removable except those of the cranium and phalanges. Competitors may obtain information and aid on application to Prof. Sollas, University College, Bristol.

THE statue of Leibnitz, intended for Leipzig, has recently been cast by Herr Lenz of Nuremberg, after the model of Prof. Hähnel, and the casting was a complete success. Herr von Miller of Munich has received an order for a colossal statue of Columbus, destined for the city of Cincinnati.

WE hear of a curious incident occurring on Siemens' electric railway at Portrush. Owing to the fact that as yet only part of the line is furnished with electric conductors, a steam-engine is still used as well as the electric locomotive. A few days ago the steam-engine while drawing its load along the line came to a stand through the accident of bursting a boiler-tube. News of the disaster having been sent to the terminus, the stationary dynamo-electric machine which supplies the current was set into action and the electric locomotive despatched to the rescue. It returned an hour later bringing the disabled steam-engine behind it.

M. FOUSSEREAU has lately measured the electric resistance of glass by charging a condenser from a known battery through a given thickness of the glass, and observing the time required to raise the potential of the condenser to a given degree. Bohemian glass was found to be from 5 to 20 times as good a conductor as ordinary glass, whilst flint glass was from 1000 to 1500 times as good an isolator. M. Foussereau found also that annealing the glass increased its resistance in some cases elevenfold.

AT a special general meeting of the Entomological Society of London, held on May 2, Prof. J. O. Westwood, M.A., F.L.S., was elected titular life-president of the Society by acclamation, the occasion being the fiftieth anniversary of the meeting at which steps were taken to establish the Society.

OUR readers will remember the accounts given last autumn of the electric launch which was successfully tried upon the Thames last autumn. This little craft has been running at intervals all the winter and is still in good trim. We learn that the Electrical Power Storage Company have three other electric boats on hand; one of them for the British Government.

A STRONG earthquake shock, with an undulating motion, was felt on the morning of the 8th, at Biancavilla, Sicily.

REPEATED shocks of earthquake were observed in various places in the Spanish province of Valencia on April 14 and 16. Some were of 2 to 3 seconds' duration.

LITERARY piracy would appear to be one of the institutions of the West to which young Japan has taken rather kindly. According to the *Japan Gazette*, the practice of pirating patents, stamps, and labels, in order to palm off spurious imitations for the genuine article, has been carried on for years, and the evil is extending in every direction. Recently a native company called the "Tokio Bookselling Company" was established in the capital, and its chief business appears to be the pirating of English and American schoolbooks. Todhunter's well known Elementary Algebra, Euclid, and other mathematical books have already been reproduced, as well as several American books, Mill's "Liberty," and other volumes. These are published as much like the originals in size, covers, &c., as possible. The Company affixes its imprint to the titlepages, but offers no explanation as to the publication in Japan, and indeed they have no hesitation in reprinting (probably through ignorance) the foreign publishers' notices, such as "Entered according to the Act of Congress in the year, &c., &c." An examination of the reprint of Todhunter's Algebra shows letters upside down, wrong fount letters, letters misplaced, and words improperly spelt, testifying to the slovenly way in which the books have been printed. There is said to be scarcely a page in the book which does not contain one or more errors in orthography, and the mathematical formulæ, which always require such care at the printers' hands, must be in a bad state when ordinary words are so neglected. The direct damage to foreign authors, patentees, and manufacturers by these petty thefts cannot be very great; the real injury is to the Japanese people themselves. Among well-known English labels, that of Bass and Co. has for many years been the subject of innumerable depredations. The striking red diamond on white ground lends itself easily to imitation, while to people who cannot read English letters at all, any strange marks below the diamond are sufficient to represent the names of the eminent brewers. Large quantities of some decoction brewed in Tokio are thus passed off in the interior as Burton ale. A patent law is wanted in Japan, not so much for the protection of foreign inventors (the Japanese Government is far too advanced to think of such a minor consideration as this) as for the protection of the pockets and stomachs of the Japanese themselves.

WE are pleased to observe that the *Chrysanthemum* magazine of Yokohama has commenced its third year with a more ambitious flight. The size is considerably enlarged, as is also the number of subjects treated and the staff of writers. The theological discussions appear to be wholly eliminated, to the increase of the general interest of the journal. The first two numbers of the new issue are now before us, and exhibit no lack of mental power. The literary treatment of the varied subjects discussed is in most cases excellent. The most powerful recruit appears to be Capt. Brinkley, R.A., who writes a serial tale with Japanese characters and scenes, as well as a serial history of Japanese keramics, which deserves more attention in this country than it is likely to get. Higher education in Japan is elaborately treated by Dr. Groth, while Capt. Blakiston, probably the best authority on the ornithology of Japan, writes on that subject. Mr. A. H. Cole is responsible for a popular paper on the Darwinian theory, and Prof. Summers describes some ancient caves near Osaka. These are but a few of the papers in the first numbers of the new magazine, the editor of which appears determined at least to deserve success. We may, however, draw his attention to one defect, surely a very grave one in a scholarly publication such as this, viz. the notices of current literature, which so far have been quite unequal to the other departments.

THE additions to the Zoological Society's Gardens during the past week include a Macaque Monkey (*Macacus cynomolgus*) from India, presented by Mrs. Florence A. Hill; a Common Rhea (*Rhea americana*) from Uruguay, presented by Mr. F. R. S. Balfour; a Common Kestrel (*Tinnunculus alaudarius*), British, presented by Mr. A. Lidbury; a Wood Owl (*Syrnium aluco*), British, presented by Mrs. W. Duncan; two Horned Lizards (*Phrynosoma cornutum*) from Texas, presented by Mr. John G. Witte; two Marbled Newts (*Triton marmorata*) from France, presented by Mr. G. H. King; two Viverrine Cats (*Felis viverrina*), an Indian Otter (*Lutra nair*), an Indian Darter (*Plotus melanogaster*), a Hamilton's Terrapin (*Clemmys hamiltoni*), three Indian Gazelles (*Gazella bennetti*) from India, deposited; two Natterjack Toads (*Bufo calamita*), four Marbled Newts (*Triton marmorata*), four Short-nosed Sea Horses (*Hippocampus antiquorum*), from France, purchased; a Black Wolf (*Canis niger*) from India, received in exchange; an Eland (*Oreas canna* ♀), born in the Gardens.

OUR ASTRONOMICAL COLUMN

D'ARREST'S COMET.—Although M. Leveau's elements of this comet for the approaching return to perihelion were communicated to the Academy of Sciences of Paris on January 22, they were unaccompanied by predicted places, and it would appear that the ephemeris has had only a very limited circulation, being confined, if we are rightly informed, to those observers who are in possession of the larger instruments. Hence comparatively few persons may have become acquainted with the circumstances under which this return of the comet to perihelion takes place, and it may not be without interest if we briefly examine the conditions as compared with those of former appearances.

Assuming as usual the intensity of the comet's light (I) to be represented by the reciprocal of the product of the squares of the distances from the earth and sun, we find the following values:—

		I.
1851.	Last observation at Berlin, Oct. 6	0·590
1858.	Last observation at the Cape, Jan. 18 ...	0·151
1870.	Last observation at Athens, Dec. 20 ...	0.154
1877.	Last observation at Athens, Sept. 10 ...	0·127

The greatest distance from the earth at any of these dates was 1·93 on January 18, 1858.

M. Leveau's elements for the approaching return apply to 1883, June 12·0 M.T. at Paris; neglecting, of course, the small effect of perturbation in the interval, the perihelion passage is found to take place 1884, January 13·5765 M.T. at Greenwich. The coordinate constants for apparent equinox of 1883, May 1, are:—

$$x = r\,.\,[9{\cdot}99502]\sin(v + \overset{\circ}{50}\ \overset{\prime}{13{\cdot}7}).$$
$$y = r\,.\,[9{\cdot}99308]\sin(v + 321\ 48{\cdot}0).$$
$$z = r\,.\,[9{\cdot}36631]\sin(v + 280\ 38{\cdot}1).$$

Hence we have the following approximate positions and distances of the comet, with the corresponding values of the theoretical intensity of light, taking dates near the time of new moon:—

12h. G.M.T.	R.A. h. m.	Decl. ° ′	Distance from Earth.	Distance from Sun.	I.
June 6 ...	13 9·6 ...	+12 48 ...	2·037 ...	2·615 ...	0·035
July 4 ...	13 13·7 ...	+10 12 ...	2·185 ...	2·415 ...	0·036
Aug. 2 ...	13 37·0 ...	+ 5 42 ...	2·321 ...	2·204 ...	0·038
Nov. 29 ...	17 58·6 ...	−16 55 ...	2·281 ...	1·427 ...	0·094
Dec. 29 ...	19 45·7 ...	−18 8 ...	2·244 ...	1·338 ...	0·111

Whence it will be seen that even when most favourably circumstanced, towards the end of the year, the intensity of light will be less than the lowest value at which the comet has hitherto been observed, viz. 0·127. On November 29 the comet sets about 2h. 8m. after the sun. It was missed at the return in 1864, and the chances of observation at its present visit are by no means encouraging.

Mr. Common informs us that he has made a thorough search for the comet with his large reflector, but without success up to May 7. He remarks that the number of faint nebulæ about its track is surprising.

The orbit of this comet almost intersects that of the lost comet of De Vico, 1844; in heliocentric longitude 339°·37′, with the elements of 1851, the distance between the orbits was only 0·0055 or 507,000 miles.

TEMPEL'S COMET, 1873 II.—The corrected elements of this body by M. Schulhof, from observations at its last appearance in 1878, indicate that, neglecting perturbations, it may be again in perihelion about November 20. The positions calculated on this assumption show that the comet will be very unfavourably placed for observation, and it may escape detection at this return.

RULES AND REGULATIONS FOR THE PREVENTION OF FIRE RISKS ARISING FROM ELECTRIC LIGHTING[1]

THESE rules and regulations are drawn up for the reduction to a minimum, in the case of electric lighting, of those risks of fire which are inherent in every system of artificial illumination, and also for the guidance and instruction of those who have, or who contemplate having, electric lighting apparatus installed on their premises.

The difficulties that beset the electrical engineer are chiefly internal and invisible, and they can only be effectually guarded against by "testing," or probing with electric currents. They depend chiefly on leakage, undue resistance in the conductor, and bad joints, which lead to waste of energy and the dangerous production of heat. These defects can only be detected by measuring, by means of special apparatus, the currents that are either ordinarily or for the purpose of testing, passed through the circuit. Should wires become perceptibly warmed by the ordinary current, it is an indication that they are too small for the work they have to do, and that they should be replaced by larger wires. Bare or exposed conductors should always be within visual inspection and as far out of reach as possible, since the accidental falling on to, or the thoughtless placing of other conducting bodies upon such conductors, would lead to "short circuiting," and the consequent sudden generation of heat due to an increased current in conductors not adapted to carry it with safety.

The necessity cannot be too strongly urged for guarding against the presence of moisture and the use of "earth" as part of the circuit. Moisture leads to loss of current and to the destruction of the conductor by electrolytic corrosion, and the injudicious use of "earth" as a part of the circuit tends to magnify every other source of difficulty and danger.

The chief dangers of every new application of electricity arise from ignorance and inexperience on the part of those who supply and fit up the requisite plant.

The greatest element of safety is therefore the employment of skilled and experienced electricians to supervise the work.

I. THE DYNAMO MACHINE

1. The dynamo machine should be fixed in a dry place.
2. It should not be exposed to dust or flyings.
3. It should be kept perfectly clean and its bearings well oiled.
4. The insulation of its coils and conductors should be practically perfect.
5. All conductors in the dynamo room should be firmly supported, well insulated, conveniently arranged for inspection, and marked or numbered.

II. THE WIRES

6. Every switch or commutator used for turning the current on or off should be constructed so that when it is moved and left it cannot permit of a permanent arc or of heating.
7. Every part of the circuit should be so determined, that the gauge of wire to be used is properly proportioned to the currents it will have to carry, and all junctions with a smaller conductor should be fitted with a suitable safety fuse or protector, so that

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[1] Recommended by the Council of the Society of Telegraph Engineers and of Electricians in accordance with the Report of the Committee appointed by them on May 11, 1882, to consider the subject. Members of the Committee:—Prof. W. G. Adams, F.R.S., Sir Charles T. Bright, T. Russell Crampton, R. E. Crompton, W. Crookes, F.R.S., Warren De La Rue, D.C.L., F.R.S., Prof. G. C. Foster, F.R.S., Edward Graves, J. E. H. Gordon, Dr. J. Hopkinson, F.R.S., Prof. D. E. Hughes, F.R.S., W. H. Preece, F.R.S., Alexander Siemens, C. E. Spagnoletti, James N. Shoolbred, Augustus Stroh, Sir William Thomson, F.R.S., Lieut.-Col. C. E. Webber, R.E.